NOTES, ABSTRACTS, AND REVIEWS.

FORECASTING MONSOON RAINFALL IN INDIA.

[Reprinted from *Nature*, London, August 4, 1923, p. 175.]

A memorandum regarding the probable amount of monsoon rainfall in 1923 was submitted in the early part of June to the Government of India by Mr. J. H. Field, officiating Director General of Observatories. For the purpose of a forecast of the monsoon, India is divided into five sections, and the several conditions which are favorable for the various sections are given, the conditions ranging over a large part of the globe and at different seasons of the year. It is noted that a marked feature of the weather in May was the comparative absence of temporary advances of the monsoon in the Arabian Sea, where the monsoon proper was behind time.

Details are given of the influencing conditions in different parts of the globe, and from these it is concluded that there would be some delay in the establishment of normal monsoon conditions within the Indian area, but it was estimated that the delay was not likely to be prolonged. With regard to the total amount of monsoon rainfall, it seemed that in the peninsula there should be a small excess, with a corresponding excess in Mysore and Malabar.

For northern India and Burma no forecast could be issued. Recent telegraphic communications from Bombay received in the middle and toward the end of July state that the agricultural outlook is now satisfactory over almost the whole of the Bombay Presidency, where enough, or more than enough, rain has fallen nearly everywhere. According to usual custom, a further monsoon forecast will be issued in August; past experience shows that the earlier forecast issued in June is usually, on the whole, the more successful.

SNOW SURVEYS ON RECLAMATION PROJECTS.

We note from the Reclamation Record for July, 1923, that Mr. Calvin Casteel, project manager of the Okanogan unit of the Reclamation Service, has made for the past six years what appears to have been a simple though effective survey of the snowfall available for run-off from West Fork of Salmon Creek, Wash. The article gives no details of the method used in determining the amount of probable run-off. It is inferred that a personal visit is made to the snow fields where the depth of snow and the proportion of the watershed covered are the factors used in estimating the probable run-off.

Since 1911 the Weather Bureau has been recommending the intensive method of snow surveying.

This method has been applied to several watersheds of relatively small extent[1] and has given satisfactory results.

It is hoped that in the interest of other project managers Mr. Casteel will supply further details of his method of determining the probable run-off from visual inspection of the snow cover on the watershed.—*A. J. H.*

THE AURORAL SPECTRUM AND THE UPPER STRATA OF THE ATMOSPHERE.

By L. VEGARD.

[Abstracted from *Philosophical Magazine*, July, 1923, pp. 193-211.]

The author, in considering recent observations of the auroral spectrum made at the Geophysical Institute of Tromsø together with those made earlier, concludes that most, if not all, of the spectral lines must be due to nitrogen. Of 35 lines measured, 29 may be ascribed definitely to nitrogen, but the remaining 6 offer some difficulties. Two of these are very probably due to nitrogen; the remaining four—of which one is the characteristic green line—can not be ascribed either to hydrogen, helium, or oxygen. An important result of these studies is the failure to find a trace of hydrogen or helium spectra in the high levels of the atmosphere where these two light elements are supposed to occur. Attempts in the laboratory to produce these spectra by means of cathode ray bombardment in mixtures of nitrogen ahd helium and nitrogen and oxygen were unsuccessful, and the conclusion reached was that the pressure of these two gases must be very much less than that of nitrogen in the region of auroral occurrence.

Various difficulties are propounded and discussed concerning the distribution of these light gases in the topmost region of the atmosphere, and the conclusion is reached that the hydrogen and helium layer does not exist. Moreover, the possible presence of a new gas (geocoronium) is dismissed. This lends to the belief that the green auroral line is due to nitrogen and that nitrogen exists to the very limit of the atmosphere.

It is found that the nitrogen pressure at a height of 400 kilometers under the assumption of a temperature of 220° A. is the same as that for 542 kilometers with an assumed temperature of 300° A. Both of these levels are within the region of auroral occurrence, hence the higher temperature demanded by the recent study of Lindemann and Dobson on meteors, (see abstract below), does not alter the conclusions concerning the extremely low nitrogen pressure. In order to produce the observed light intensity at those levels the density of electric radiation must be enormous; indeed, this leads to a value of radiation intensity so great that it could not occur. Therefore, in some way, the nitrogen pressure must be greater than that calculated.

Owing to the photoelectric effect of the sun's action upon the upper layers of the atmosphere, the author believes that a layer of positive ions must exist which would give the effect of increased density. Thus light gases such as helium and hydrogen when ionized would become so light as to fly into space, thus accounting for their absence in the spectrum. Further, the failure to produce the auroral lines in the laboratory is probably due to the inability to reproduce the high degree of positive ionization in the gas. This would solve the problem of Lindemann and Dobson, and make unnecessary the assumption of improbable temperatures in the high atmosphere.

A footnote, inserted in the proof, states that since preparing the manuscript for his article the author has found that the highly ionized upper layer of nitrogen can not exist in the form of a gas, but is probably produced by the charge being carried by crystals of nitrogen. This renders some modification of the mathematical considerations necessary—a matter that will be dealt with in a second paper.—*C. L. M.*

THE CHARACTERISTICS OF THE ATMOSPHERE UP TO 200 KILOMETERS AS INDICATED BY OBSERVATIONS OF METEORS.

By G. M. B. DOBSON.

[Abstr. from *Quart. Jour. Roy. Met. Soc.*, July, 1923, 49: 152-165, 6 figs.]

The increasing use of meteors in meteorology is a welcome development. Kites and balloons, during the past quarter century, have given us a fairly accurate

[1] Henry, A. J. The density of snow, Mo. WEATHER REV., March, 1917, 45; 102-107.